

## Artículo de investigación

# Archive activities in terms of electronic document authenticity and copy number variation

Actividades de archivo en términos de autenticidad de documentos electrónicos y variación del número de copias

Arquivar atividades em termos de autenticidade de documentos eletrônicos e variação do número de cópias

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## Abstract

The article is devoted to the problems of archive activity during the digital era, which are conditioned from the authors' point of view by the introduction of electronic documents that have changed the content of paperwork and archiving key categories - authenticity and copy number variation, as well as related originality and authenticity. The technologies of work in the archive, always considered as a unique system of originals are based on the traditional understanding of these categories. Using the method of expert assessments during the determination of key category content, the authors conclude that the current activity of the archives is aimed at copy production activity increase, their management and the provision of authenticity, reliability, integrity and suitability for use. Nowadays the issue of document archiving requires the consolidation of state and non-state structure efforts to develop a new attitude to the authenticity of electronic documents, to change the usual nature of archival institution interaction with users and interested citizens, state authorities and administration, law enforcement and judicial system.

**Keywords:** authenticity, copy number variation, authenticity, archive document, electronic document, archiving.

## Resumen

El artículo está dedicado a los problemas de la actividad de archivo durante la era digital, que están condicionados desde el punto de vista de los autores por la introducción de documentos electrónicos que han cambiado el contenido del papeleo y las categorías clave de archivo: autenticidad y variación del número de copias, como así como la originalidad y autenticidad relacionadas. Las tecnologías de trabajo en el archivo, siempre consideradas como un sistema único de originales, se basan en el entendimiento tradicional de estas categorías. Usando el método de evaluaciones de expertos durante la determinación del contenido de la categoría clave, los autores concluyen que la actividad actual de los archivos está dirigida a aumentar la actividad de producción de copias, su gestión y la provisión de autenticidad, confiabilidad, integridad y adecuación para su uso. Hoy en día, el tema del archivo de documentos requiere la consolidación de los esfuerzos de la estructura estatal y no estatal para desarrollar una nueva actitud hacia la autenticidad de los documentos electrónicos, para cambiar la naturaleza habitual de la interacción de la institución archivística con los usuarios y ciudadanos interesados, las autoridades estatales, la administración y la ley.

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**Palabras claves:** autenticidad, variación del número de copias, autenticidad, documento de archivo, documento electrónico, archivo.

## Resumo

O artigo é dedicado aos problemas da atividade de arquivo durante a era digital, eles são condicionados a partir do ponto de vista dos autores para a introdução de documentos eletrônicos que mudaram o conteúdo de documentos e categorias de arquivos-chave: autenticidade e variação do número de cópias, bem como a originalidade e autenticidade relacionadas. Tecnologias de trabalho no arquivo, sempre considerado como um único sistema original, com base no entendimento tradicional destas categorias. Usando o método de avaliações de peritos para a determinação da categoria-chave, os autores concluem que a atividade de arquivos atual visa aumentar cópias atividade de produção, gestão e prestação de autenticidade, confiabilidade, integridade e adequação para uso. Hoje, a questão do arquivamento de documentos requer a consolidação dos esforços de estruturas estatais e não-estatais para desenvolver uma nova atitude em relação à autenticidade dos documentos eletrônicos, para mudar a natureza habitual da interação da instituição de arquivo utilizadores e cidadãos interessados, autoridades estatais, administração e direito.

**Palavras-chave:** autenticidade, variação do número de cópias, autenticidade, documento de arquivo, documento eletrônico, arquivo.

## Introduction

### 1 Introduction to the problem

IT-technologies have changed the “record keeping” of Russia, like most other countries, giving tremendous advantages concerning documentary flow speed, the accuracy of document processing, the efficiency in the organization of current document storage and much more. However, having changed the technologies of paperwork, they influenced and violated its usual and centuries-old connections with archiving to a certain extent.

The key categories of document authenticity and copy number variation were obtained in such a phenomenon as an electronic document (hereinafter referred to as ED), an unexpected combination, which destroyed the usual ideas about the document itself, necessitated the change of attitude towards it as the fact of cultural national and world heritage. In practical terms, the new combination of authenticity and copy number variation in the ED marked the inconsistency of some principles and methods of working with archival documents developed over the centuries, made it to revise the tasks and the principles of archival document organization radically, and most importantly, changed the status of the archive as an

information system for original document storage.

### 2 The urgency of the problem

The problem of electronic document authenticity has been at the epicenter of the problems considered by the scientific community of archivists, historians, lawyers, and cultural studies for more than a decade. The archival authorities of different countries are actively discussing the issues of ED safety, reliability improvement, created in organizations and received for storage in archives; they are engaged in IT technology testing and implementation to manage the existing funds of documents on paper and analog media; they try to find the most economical and effective ways for technical problem solution. The spectrum of these problems has not disappeared from the arena of scientific and professional disputes for more than 20 years. Archivists join the work on national, regional and international projects to understand, learn to predict, and most importantly, to ensure the long-term preservation of documents of a new type. Despite the fact that lately the development of technologies has removed many questions, the provision of reliability to ED continues to be technical, legal, and organizational problem.

Unfortunately, the majority of state archives of Russian Federation subjects is not accepted for storage, despite the availability of permitting standards and EDs signed with electronic signatures: the percentage of electronic documents from the total volume of RF Archival Fund is 0.2% (Rosarchiv, 2016). The difficulties in the transfer of electronic documents for archival storage are also experienced by the source organizations of RF Archival Fund development. The basis of these contradictions is the misunderstanding and the inconsistency of actions to ensure the archives with authentic ED. Already 15-20 years after the receipt of such materials in archival institutions, this problem is not solved for them and is aggravated if the task of perpetual storage is posed. So far, there is no common point of view on the procedures which will guarantee the reliability of information in the ED after their forced changes (conversion, migration, emulation, encapsulation, etc.).

### 3 Problem study

During the search of a solution to the problem of implementation and delimitation in the long-term archival storage of the necessary properties and the signs of ED authenticity and copy number variation, three research trends can be distinguished: the research projects of international professional communities of archivists; the interdisciplinary groups of scientists and practitioners who have a comprehensive approach to the problem solution; the national projects of archival institutions of different countries.

Among international groups of researchers who deal comprehensively with the problems of ED authenticity and copy number variation in the aspect of long-term archival storage provision, one should mention UNESCO and the International Council of Archives (ICA). In recent years, the traditional issues of working with documents in the digital age at the ICA congresses were added by the range of organizational issues: the establishment of cooperation between all interested parties to solve the problems of ED long-term and eternal storage, the use of ED during the establishment of historical truth and the restoration of justice in court, and also during the determination of educational program content and the composition of professional competencies. The world professional community has formed the policy in the field of cultural heritage digitization (Kuybyshev & Brakker, 2005), (Nol, 2001). "All

the activities of archives ensuring the safety, the availability and the authenticity of digital documents are relevant, regardless of the environment in which they are created, circulated and used" (Rosarchiv, 2016).

An interdisciplinary approach to research is defended by the group of scientists and practitioners headed by L. Duranty (the head of the School of Archival Studies, the professor at the University of British Columbia in Canada). During the period of 1999-2006 the team of experts from different subject areas and different countries implemented the international project InterPARES, the purpose of which was to study the issues of creation, maintenance and long-term preservation of electronic documents (Duranty & Thibodeaux, 2006). The project analyzed and compared the legislation and the government policy of a number of countries at different levels of government; many initiatives have been studied; The perception of ED was evaluated "not only in the traditional legal and administrative environment, but also in the field of art, science and in the developing areas of "e-government" (Duranty, 2009).

Today, a full-scale scientific and legal study of approaches in Russia to the organization of archival business during the development of ED archives is implemented by the representatives of the state archive management (Read the report of Rosarkhiv head A.N. Artizov "On the activity of federal executive bodies for defense, security and law and order in the field of archives" at the meeting of RF Committee on Defense and Security within RF Federal Assembly, where the leaders of the RF Defense Ministry, the MIA of Russia, ESM of Russia, Rosguard, FSB took place) (Rosarchiv, 2018). The same is observed in RF subjects (Read "Public hearings in Udmurtia", 2018). A full-scale study of ED problem is conducted by VNIIDAD, which reflects its findings in scientific reports, analytical reviews, and methodological recommendations (the History of VNIIDAD, 1966-2016), including the research report on state contract No. 55 (22.05.2012) "The conduct of research in the field of archival document acquisition, storage, accounting and use", implemented as the part of the Federal Target Program "The Culture of Russia (2012-2018)" activities (Yumasheva, 2012). The contribution to the discussion and the development of ED classification, authenticity and electronic copy number variation in the implementation of long-term storage was made by the experts from

various scientific fields: law (Voynikanis & Kalyati, 2011). information security (Baranov, 2016), library (Kuybyshev L.A., Brakker N.V. and museum affairs (Bogomazova, Itskova, Dremailov, Lagutin and Nol, 2003), historians and archivists (Zalaev, 1999; Mikhailov, 2002; Mikhailov, 2002; Kuznetsov, 2002 and Yumasheva, 2012).

According to the experts, the main problem of IT-technology application in the organization of long-term storage of cultural heritage is the ability to identify the originals and ensure the authenticity of copies for a long time during the rewriting of electronic information. This and other problems of ED long-term storage organization require not so much a technical resolution but an organizational uniting of experts into professional associations and scientific groups, the joining of archival body representatives into interdepartmental national joint structures to work out a common solution to organizational, technical and organizational legal issues, the economic aspects of the problem concerning the long-term storage of documents.

#### 4 Hypotheses

The category of authenticity, identified in some cases with originality, and the category of copy number variation determined the practice of archiving over thousands of years. Their transformation, which was discovered with the advent of ED phenomenon, began to change the character, the habitual volume and in many ways the ways of archival work implementation radically, including the functions and the powers of archival organizations and structural divisions.

#### Methods

They used the method of expert assessments in order to determine the scope of functions that will be transformed in the archives with the increase of ED funds sent for long-term storage. It allows you to assess the current state of the problem, to identify the range of new issues that will have to be addressed soon by the heads of paperwork and archive industries, as well as the scope of public and private law protection. Expert evaluations were monitored on the material of scientific reports and publications according to the results of research conducted over the past 20 years; The problematic issues were also taken into account at seminars and practical conferences with the participation of

archivists of municipal, regional and corporate archives, as well as corporate archives of source organizations for the development of the non-state part of RF Archival Fund (for example, the archive of PJSC "MMK", Magnitogorsk). Russian and international practitioners, the heads of enterprises and scientific organizations, the archivists of VNIIDAD reports were among the experts who spoke on the problem of authenticity and copy number variation category transformation during the implementation of ED long-term storage in archives.

The method of regulatory source analysis allowed to determine the areas of interaction with ED, which have not been clearly regulated yet by the supervisory authorities; and also made it possible to assess the sufficiency / insufficiency of the existing standards to solve the contradictions in the practice of archived ED long-term storage organization.

#### Main part

##### 1 The traditional understanding of authenticity and document copy number variation category.

"Basic Rules of Organization Archive operation", defining the organization of document storage in archives as "the system of measures, including the rational placement of documents, the control over their movement and physical condition, the copying of documents in order to create an insurance fund and the fund of use, the restoration of the original properties or close to the original ones and the external features of documents damaged or destroyed" (Basic Rules, 2002), give a general idea of the archive activities. Each of these functions is based on a clear understanding and a practical delineation of originality, authenticity and copy number variation categories.

The procedure of work with originals and copies is legislatively and organizationally defined in both state and departmental archives. The provisions and the regulations clearly define the place of originals and copies in relation to paperwork and archiving procedures. Thus, the Supreme Court of Russian Federation taking the decision on the issue of copies, establishes the exclusive right to keep the originals between courts of different instances: "The copies of court decisions made by the appeals, cassation and supervisory instances of the Supreme Court are not issued

(not sent) by the results of court case consideration due to the fact that the originals of these court decisions are filed into court cases, which are returned to the courts that considered these court cases as the first instance ones" (p. 3.8 The provision on the procedure of familiarization with the information about the Supreme Court activities, 2016).

With the advent of ED, there was the shift in the boundaries between the original and the copy, conditioned by the special nature of a new type of documents replication, which in its turn violated the usual attitude to the document copy number. The Russian national terminological standard considers "the document, the information about the author, the time and the place of creation of which, contained in the document itself or identified by other means, confirm the authenticity of its origin" as authentic one (paragraph 20 of GOST R 7.0.8–2013). The definition draws attention to the readability of the necessary attributes (information about the author, the time and the place of creation), and the very possibility of their authenticity confirmation and, therefore, the accuracy of all the information in the document. In the same GOST, there is a definition of the related notion "document original" "the first or only copy of the document" (GOST R 7.0.8–2013, p. 21) which practically coincides with the term "original" by volume. The ability of documents to replicate has long been endowed the first or only source with a special status. Over time, during the practice of document use, the attitude to the original is formed as the first or "main copy of the document" (Raizberg, Lozovsky and Starodubtseva, 1999), focusing on its value as a standard. In the State Standards dedicated to different copying procedures, the concept of "original document" is interpreted as follows: "A document obtained as the result of a person's creative activity on the record of a primary source data on a tangible medium, regardless of the technical means used and the ways of its record" (GOST R 13.1.107-2005, the same in p. 3.1.1. of GOST R 33.3.02-2008, p. 3.2) "A brief glossary of terms from the paperwork" by M.V. Kirsanova interprets the term on the basis of their specificity: 1) the original copy of the document; 2) the copy of the document, which is the source material for copying (M.V. Kirsanova, 2003). In Russian national consciousness, the terms "original" and "source" are identical concepts, interpreted through each other. In paperwork and archiving, they differ by

their oppositions: original - a falsified document, source - copy.

## 2 The transformation of original and copy features in electronic documents

In ED, the categories of originality, authenticity and copy number variation have completely different indicators of objectification than for the documents created by traditional methods. During the comparison of documentation procedures, it turned out that the life cycles of traditional and electronic documents, considered through the prism of authenticity and copy number variation as the categories essential for archival storage, differ in a number of points. Thus, the key stage of the "decision" (setting the storage periods / the decision on destruction) for traditional and electronic documents occurs at different times: traditional documents are considered at the value examination stage (at the end of the life cycle), when documents are no longer required for business goals; electronic documents are considered at the stage of creation (at the very beginning of the life cycle during the first saving). The transfer of some "decision" to a later date can't guarantee authenticity any longer, due to the ease of manipulation with this format of documents. This difference is not always recognized by the regulators and the subjects of documentation processes.

L. Duranty's team, having studied the practice of ED use, noted the changes in the attitude of state structures of different countries to the originals and copies. There was a discrepancy between the theory and the practice of "original" understanding. The diplomacy established that "the original document in the electronic system is the first presentation of the received document, and the original cease to exist after such a presentation closing" (Duranty, 2009).

The international standard ISO 15489-2001 introduced another synonym in Russian terminology - "authentic document". The national standard GOST R ISO 15489-1-2007 (p. 7.2.2) states: "A document is authentic if it: a) complies with the established rules; b) was created or sent by an authorized person; c) was created or sent at the time indicated in the document" (GOST R ISO 15489-1-2007). Moreover, according to this standard, the authenticity of the document cannot be achieved without the other three properties: integrity, reliability and suitability for use (ibid p. 6.3).



So, the main property of a document is not originality, but the ability to develop complete confidence in its information and the author's responsibility for the content and other parameters of the document. Therefore, a copy may also be authentic. According to L. Duranty, "Authenticity is maintained and verified by the provision of a document identity and integrity. The distinctive features of a document are developed and maintained by specifying the names of the persons at least who participated in the creation of the document (for example, the author, the addressee); the actions or the topics to which the document relates; compilation dates, the filing and transfer; documentary form; an electronic presentation of a document (or a format); document links with other documents through the use of classification codes or naming conventions; the information on the availability of applications" (Duranty, 2009). Of course, these properties provide the managerial, legal, and historical meaning of document use, but all other properties are lost (the value, the uniqueness of a material carrier, the time and the method of recording, etc.).

The confirmation of ED authenticity in archive conditions is associated not only with technical, but also with legal tasks of required organizational condition recreation that must be addressed by the fund development (for example, the availability of appropriate software and / or the provision of archives with the authentication function). Does the archive have the same status as the fund founder? No. Does the electronic signature ensure the preservation of the necessary organizational conditions? Russian expert opinion is still prone to negative one (Baranov, 2016).

Initially, a systemic feature was introduced into the ED, if not an error. At the end of InterPARES project, a disappointing conclusion was made: "the considerations related to long-term preservation provision almost never affect the process of document creation in an electronic environment (Duranty, 2009).

The InterPARES project group has published two fundamental conclusions, important for long-term storage problem solution: 1) (objective conclusion) "it is impossible to save electronic documents - you can only save the opportunity of their reproduction"; 2) (Organizational) "the custodian must be involved to the work with documents from the very beginning of their life

cycle so that he can confirm that the copies that will be taken for permanent storage are the authentic copies of the creator's document indeed" (Duranty, 2009).

### 3 Current tasks of the archival industry in the field of work with electronic documents

Nowadays, when the problem of archive activity related to ED is raised, two vectors of tasks are indicated: 1) the tasks related to the digitization of archival documents (that is, the creation of electronic images (copies) from paper documents or the documents on analog media); 2) the task of genuine ED receiving and the long-term archival storage organization of proper electronic documents. Each vector has its own specifics and the ways of practical resolution.

The first vector can be qualified as the intensification of the traditional functionality for a reserve fund of copies and a use fund creation. Digitization offers users an additional, more mobile and convenient way to obtain archival information. Although here, the national authorities of various countries, including Russia, discuss the problems of national information system cybersecurity, in addition to organizational issues: document selection criteria for digitization; technical requirements; the provision of electronic copy adequacy to the original; the development of management system for the data arrays of archival document digital copies; the development of marking and recording system for electronic copies (Yumasheva, 2012). Let's add to the list the issues of logistics and archivist training.

In the framework of the first vector, the development of a copy number variation concept takes place: a copy acquires the features of the original, since it serves as the reference for later copying. For this, the concept of a master copy appeared in normative sources - "an "ideal" copy made from the original document or a standard". It is indicative that the first digital copy "made from the original archive document and not subjected to any processing, including the multiple rewriting (migration, replication) to another medium "is also called a copy-original or even an original, because the master copy, like the original, "is inviolable and not intended for use" (Yumasheva, 2012, pp. 8-9). Further they distinguish the later copies by status and function: the first generation copy (duplicate; working copy) - a digital copy of the archival document

obtained by computer conversion of the master copy; and the copy of the generation number, i.e., a digital copy of the archival document obtained by computer conversion of the first generation copy (duplicate) (Yumasheva, 2012, p. 9).

A completely different range of problems (including organizational ones) has to be addressed by archives when it comes to the accept and the organization of electronic document long-term storage that were not created on the basis of paper (analog) versions and received the signs of the original, legally enforced by computer technologies.

It has already been mentioned that the nature of ED is such that the degree of their alienation as independent objects on a material carrier is rather conditional. The fact is that the life cycle of ED is not separable from the software life cycle, the duration of which is estimated now by 5-7 years. Of course, this does not correspond to the tasks of archival material long-term storage. The change of the software platform during the long-term storage of ED can lead to a complete loss of the document meaning due to the inability of their viewing.

The choice of a storage medium for archival storage is noted as an independent problem of practice. According to expert estimates, "the choice depends on the type of stored electronic documents and their total volume, the intended storage period for documents and the access to them, the nature of medium production and the intended storage modes, the requirements for document authenticity provision and the possibility of "electronic document use as written or forensic evidence" (Tikhonov, 2006).

The cause of real and potential can be economic, since computer technologies (media and programs) are removed from production quickly. Therefore, in 10-15 years the archives will face the problem of information reproduction from existing media (even the best ones at the time of recording). "Optimists" from the manufacturers of technologies recommend the rewriting of materials for ED (Betsy A Fanning 2017) and name migration as one of solutions - "the moving of documents from one system to another with the preservation of document authenticity, integrity, reliability and their suitability for use" (Recommendation Draft, 2013). Experts attribute the following to the problematic characteristics of migration: the

complexity and the high cost of ED migration in the so-called user formats; the lack of simple converters for database migration; the ability to distort the originals of electronic document significantly (complex-structured and multi-format resources: the documents from project automation systems (CAD) and geographic information systems, multimedia products, etc.) (Tikhonov, 2006). All this range of problems is dealt by the archives of organizations in accordance with Russian standards [Rosarkhiv recommendation draft, 2013].

The disadvantages of migration are reduced by software emulators. "Emulation is the imitation of one device functioning by the means of another device or a computer, at which the simulator perceives the same data, executes the same program and achieves the same result as the simulated one" (GOST 15971-90.). But even here there is no complete guarantee that any operating environment can be emulated into another one. Today, American archivists consider the inclusion of electronic documents in the cross-platform file format - encapsulation (Information management. 2002) as the most optimal way for electronic document exchange and long-term storage. But, like emulation, encapsulation is studied poorly for the long-term storage of electronic documents, and there are still few test descriptions of positive experience.

It is obvious to the professional community that some archives cannot be responsible for the fact that the documents allocated for the transfer to the archive cannot be read or in any way used and processed by the receiving archive because of the lack of an appropriate software. Unfortunately, there are enough such examples in Russian practice. Many source organizations developing the non-governmental part of RF Archive Fund are not ready to transfer AED, for example, to municipal archives, together with multi-million-cost software, which is the asset of a commercial organization and which is often a technical condition of business with the contractors of this company (including international ones). Although the provision of a software product to the archive is performed by Russian regulations (The Rules of 2015), the companies do not hurry to transfer their assets to the state or municipality free of charge (Andreeva S.A., Velikanova S.A., Chernykh O.B., Kozhushkova N.A., Samarokova I.A., Arakcheeva Z.A., 2017). The issue is whether the company should take care that the copies of EDs transferred to the archives have such

technical characteristics which suit the receiving party. The international community of archivists and documentation managers solves it unequivocally: it should.

#### **4 The provision AED authenticity signed by electronic digital signature**

An independent, relevant, but not resolved problem for the organization of long-term archival storage is constituted by ED, signed with an electronic signature (further EDS). The general issues of ED preservation are added by the issue of document authenticity and validity maintaining. The experts in the field of electronic information security come to the conclusion today that a serious shift of the focus from the technical side to organizational and legal issue took place with the introduction of electronic signatures, and organizational and legal issues seem to be more complicated if you take into account Russian legal practice (Baranov, 2016).

The process of archive development by the electronic documents with EDS inherited the problem of key requisite authenticity confirmation from the operational environment (the stage of paperwork), which provides legal force to the document, i.e. EDS. Among the various obstacles that create the problems with the document authenticity identification, the experts say that the requisite (EDS) can live independently of a person, creating the conditions for fraud and ED full or partial falsification. There are the cases when a person died, and his electronic signature remained valid for a year: "The company continued to use his electronic signature, submitting reports with it. It is almost impossible to revoke an electronic signature until the court recognizes a person as officially missing, the certifying center does not have the right to revoke the signature" (Baranov, 2016).

#### **Conclusions**

These vectors of archival work with electronic documents and electronic images determined the main duty of archives: to maintain trust in ED for a long time period (or forever). And this is not a technical, but an organizational problem related to the endowment of archival institutions with a new function - the duty to confirm the authenticity of electronic copy periodically.

The problems of long-term storage of ED are historically born by "systemic" errors due to the lack of attention to the practice of archiving. The advantages of ED at the stage of paperwork turn into serious shortcomings of archival storage.

This problem has also affected the corporate archives of non-governmental organizations, but it is quite removable due to other organizational conditions of archiving in this category of archives (both organizationally and technically by the introduction of the "correct" EDS). Another thing is the state (federal and Russian Federation subjects), municipal and even departmental archives. They deal with the arrays of documents that have already been created by different fund-forming companies operating in different organizational conditions. Without the possibility to influence the elimination of system errors at the start, archives are not able, either technically or organizationally, to maintain the main properties of archived documents for long periods of storage; they are forced to suspend the acquisition of funds, violating the contractual relations and regulatory deadlines on the receiving of document arrays from the fund founders; sometimes they are forced to engage in unproductive and intractable disputes (legal, financial, technical, etc.) with the organizations-sources of the non-governmental part of RF Archival Fund development.

#### **Conflict of interest**

The authors declare that the provided data do not contain a conflict of interest.

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